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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/661,184	09/12/2003	Yuhua Li	UCF-370	8302

7590 10/31/2005

Law Offices of Brian S. Steinberger
101 Brevard Avenue
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EXAMINER	
MOONEY, MICHAEL P	
ART UNIT	**PAPER NUMBER**
2883	

DATE MAILED: 10/31/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/661,184	Applicant(s) LI ET AL.	
	Examiner Michael P. Mooney	Art Unit 2883	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 July 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-50* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10,12-24,26-30,32-43 and 45-49* is/are rejected.

7)☒ Claim(s) *11,25,31,44 and 50* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *9/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 7, 10, 16-17, 24, 26, 30, 35-36, 43, 45, 49 are rejected under 35 U.S.C. 102b as being anticipated by Bigo (5911015).

Bigo teaches a parametric amplifier (fig. 5 NOLM) pumped by input data (e.g., F1 of figure 4; figure 5); and a continuous wave (CW) laser as the probe for the parametric amplifier (fig. 5 NOLM); a saturation amplifier G1 for receiving output from the parametric amplifier, wherein a regenerated output signal is generated. (figs. 4, 5). Thus claim 7 is met.

Bigo teaches a pulsed light source (figs. 3-4, F1 and associated text); a parametric amplifier (fig. 4; fig. 5, NOLM); and a saturation amplifier G1 wherein input data is used as the pump (e.g., F1 of figure 4; fig. 5) for the parametric amplifier (e.g., NOLM of fig. 5) and output of the parametric amplifier is input into the saturation amplifier G1 (fig. 5). Thus claim 16 is met.

Bigo teaches a CW laser (See CLK of figure 5 and/or figure 3); and a saturating parametric amplifier (fig. 4; fig. 5), wherein input data is used as a pump for the (e.g.,

F1 of figure 4) saturating parametric amplifier (e.g., NOLM of fig. 5). Thus claim 26 is met.

Bigo teaches a pulsed laser source (figs. 3-5, F1 and associated text); a parametric amplifier (e.g., NOLM of figs. 4, 5); and a saturation amplifier (e.g., G1 of fig. 5) wherein input data is used as the pump for the parametric amplifier (NOLM; figs. 3-5) and output of the parametric amplifier (NOLM) is input into the saturation amplifier (e.g., G1 of fig. 5).

Thus claim 35 is met.

Bigo teaches wherein the pulsed laser source is generated from: a clock signal recovered from the input data (figs. 3-5). Thus claims 17, 36 are met.

Bigo teaches an apparatus comprising: a pulse laser source (figs. 3-5, F1 and associated text) and a saturating parametric amplifier (NOLM), wherein the input data is used as a pump for the saturating parametric amplifier (fig. 4;.fig. 5).

Thus claim 45 is met.

Bigo teaches wherein the polarization of the CW laser is aligned with polarization of the input data (figs. 5, 6; col. 7 lines 52-56; col. 8 lines 1-37). Thus claims 10, 24, 30, 43, 49 are met.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-6, 8-9, 12, 18-20, 27-29, 37-39, 46-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bigo (5911015).

Bigo teaches a parametric amplifier (fig. 5 NOLM) pumped by input data (e.g., F1 of figure 4; figure 5); and a continuous wave (CW) laser as the probe for the parametric amplifier (fig. 5 NOLM); a saturation amplifier G1 for receiving output from the parametric amplifier, wherein a regenerated output signal is generated. (figs. 4, 5).

Bigo teaches a pulsed light source (figs. 3-4, F1 and associated text); a parametric amplifier (fig. 4; fig. 5, NOLM); and a saturation amplifier G1 wherein input data is used as the pump (e.g., F1 of figure 4) for the parametric amplifier (e.g., NOLM of fig. 5) and output of the parametric amplifier is input into the saturation amplifier G1 (fig. 5).

Bigo teaches a CW laser (See CLK of figure 5 and/or figure 3); and a saturating parametric amplifier (fig. 4; fig. 5), wherein input data is used as a pump for the (e.g., F1 of figure 4) saturating parametric amplifier (e.g., NOLM of fig. 5).

Bigo teaches a pulsed laser source (figs. 3-4, F1 and associated text); a parametric amplifier (e.g., NOLM of figs. 4, 5); and a saturation amplifier (e.g., G1 of fig. 5) wherein input data is used as the pump for the parametric amplifier (NOLM; figs. 3-5) and output of the parametric amplifier (NOLM) is input into the saturation amplifier (e.g., G1 of fig. 5).

Although Bigo does not explicitly state "wherein the parametric amplifier is an optical fiber with its zero-dispersion wavelength optimized for parametric amplification, which should be approximately the same as that of the wavelength of the input signal and the saturation amplifier is a semiconductor optical amplifier" it would have been obvious to do so because it is conventionally known to optimize a parametric amplifier NOLM such as in figure 5 of Bigo for parametric amplification by ensuring the zero dispersion wavelength is such that it is approximately the same as that of the wavelength of the input signal; furthermore, it is conventionally known to use semiconductor amplifiers (SOAs) as in-line saturation amplifiers (e.g., G1 of Bigo figure 5).

One of ordinary skill would have been motivated to ensure the zero dispersion wavelength is such that it is approximately the same as that of the wavelength of the input signal for the purpose of optimizing performance parameters. Furthermore, one of ordinary skill would have been motivated to use SOA(s) as in-line saturation amplifiers for convenience due to availability and/or optimizing system performance.

Thus claims 12, 20, 29, 39, 48 are rejected.

Regarding claims 8-9, 18-19, 27-28, 37-38, 46-47 although Bigo does not explicitly mention "NRZ" and "RZ" signals, it would have been obvious to do so because NRZ and RZ signal formats are conventionally used in the long distance optical communications art. One of ordinary skill would have been motivated to use NRZ and RZ signal formats for the purpose of utilizing formats which are extremely well known, commonly used and/or effectively transport signals. Thus claims 8-9, 18-19, 27-28, 37-38, 46-47 are rejected.

Each and every element of each of the method claims 1-6 is rendered obvious by the reasons and references given above and conventional principles in the art. If Applicant disagrees with this obviousness holding, then Applicant should submit evidence showing this obviousness holding is errant. Examiner will then consider restricting. Thus claims 1-6 are rejected.

Claims 13-15, 21-23, 32-34, 40-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bigo (5911015) and further in view of Watanabe (6853774).

Bigo teaches a parametric amplifier (fig. 5 NOLM) pumped by input data (e.g., F1 of figure 4; figure 5); and a continuous wave (CW) laser as the probe for the parametric amplifier (fig. 5 NOLM); a saturation amplifier G1 for receiving output from the parametric amplifier, wherein a regenerated output signal is generated. (figs. 4, 5).

Bigo teaches a pulsed light source (figs. 3-4, F1 and associated text); a parametric amplifier (fig. 4; fig. 5, NOLM); and a saturation amplifier G1 wherein input

data is used as the pump (e.g., F1 of figure 4) for the parametric amplifier (e.g., NOLM of fig. 5) and output of the parametric amplifier is input into the saturation amplifier G1 (fig. 5).

Bigo teaches a CW laser (See CLK of figure 5 and/or figure 3); and a saturating parametric amplifier (fig. 4; fig. 5), wherein input data is used as a pump for the (e.g., F1 of figure 4) saturating parametric amplifier (e.g., NOLM of fig. 5).

Bigo teaches a pulsed laser source (figs. 3-4, F1 and associated text); a parametric amplifier (e.g., NOLM of figs. 4, 5); and a saturation amplifier (e.g., G1 of fig. 5) wherein input data is used as the pump for the parametric amplifier (NOLM; figs. 3-5) and output of the parametric amplifier (NOLM) is input into the saturation amplifier (e.g., G1 of fig. 5).

Although Bigo does not explicitly state "wherein the parametric amplifier is an optical fiber with its zero-dispersion wavelength optimized for parametric amplification, which should be approximately the same as that of the wavelength of the input signal and the saturation amplifier is a semiconductor optical amplifier" it would have been obvious to do so because it is conventionally known to optimize a parametric amplifier NOLM such as in figure 5 of Bigo for parametric amplification by ensuring the zero dispersion wavelength is such that it is approximately the same as that of the wavelength of the input signal; furthermore, it is conventionally known to use semiconductor amplifiers (SOAs) as in-line saturation amplifiers (e.g., G1 of Bigo figure 5).

One of ordinary skill would have been motivated to ensure the zero dispersion wavelength is such that it is approximately the same as that of the wavelength of the input signal for the purpose of optimizing performance parameters. Furthermore, one of ordinary skill would have been motivated to use SOA(s) as in-line saturation amplifiers for convenience due to availability and/or optimizing system performance.

Regarding claims 8-9, 18-19, 27-28, 37-38, 46-47 although Bigo does not explicitly mention "NRZ" and "RZ" signals, it would have been obvious to do so because NRZ and RZ signal formats are conventionally used in the long distance optical communications art. One of ordinary skill would have been motivated to use NRZ and RZ signal formats for the purpose of utilizing formats which are extremely well known, commonly used and/or effectively transport signals.

Regarding 13-15, 21-23, 32-34, 40-42 although Bigo does not explicitly mention "photonic crystal" or "third-order nonlinear", Bigo does teach a nonlinear optical loop mirror (NOLM) (e.g., col. 1 lines 45-50, col. 7 lines 15-21).

Furthermore, Watanabe teaches a NOLM (e.g., col. 4 lines 2-5) in which the NOLM is made of photonic crystal fiber (e.g., col. 6 lines 48-58). Additionally, Watanabe teaches using a fiber with a "third-order nonlinear optical medium" and cascading a plurality of such NOLMs (col. 5 lines 36-55). Hence, Watanabe teaches the elements of claims 13-15, 21-23, 32-34, 40-42.

Bigo and Watanabe are combined by taking the technology of Bigo which teaches a NOLM used in optical regeneration and applying it to the third-order nonlinear

photonic crystal fiber including cascaded NOLMs technology of Watanabe to obtain the instant invention of a third-order nonlinear photonic crystal fiber including cascaded NOLMs for optical regeneration. It would have been obvious to one of ordinary skill in the art at the time the invention was made to make such a combination for the purpose of providing a device that is more compact, easier to integrate, and/or has higher performance characteristics.

One of ordinary skill would have been motivated to produce such a device in order to obtain a more compact, easily-integrated high performance device.

Thus claims 13-15, 21-23, 32-34, 40-42 are rejected.

Allowable Subject Matter

Claims 11, 25, 31, 44, 50 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art, either alone or in combination, does not disclose or render obvious ~~a~~ wherein the polarization of the light source/CW/laser is linear and aligned to have maximal overlap with polarization of the input data, and the power of the CW laser is controlled so that the power of regenerated data is independent of the state of polarization of the input data in combination with the rest of claim 11, 25, 31, 44 or 50.

10/26/05

It is noted that each of claims 11, 25, 31, 44 or 50 is allowable because the unique combination of each and every specific element stated in each the said claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael P. Mooney whose telephone number is 571-272-2422. The examiner can normally be reached during weekdays, M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on 571-272-2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-1562.

Michael P. Mooney
Michael P. Mooney
Examiner
Art Unit 2883

Frank G. Font
Frank G. Font
Supervisory Patent Examiner
Art Unit 2883

FGF/mpm
10/26/05